

What is claim d is:

1. A surface acoustic wave filter, comprising:
at least one piezoelectric substrate;
at least one surface acoustic wave resonator formed on said piezoelectric substrate; and
a longitudinal coupled mode type surface acoustic wave filter formed on said piezoelectric substrate,
wherein said surface acoustic wave resonator and said longitudinal coupled mode type surface acoustic wave filter are cascaded together,
wherein said surface acoustic wave resonator is also connected to at least one inductor having one end grounded, and
wherein an attenuation band of said at least one surface acoustic wave resonator is apart from a pass band of said longitudinal coupled mode type surface acoustic wave filter in the direction of higher frequencies.
2. A surface acoustic wave filter, comprising:
at least one piezoelectric substrate;
at least one surface acoustic wave resonator formed on said piezoelectric substrate; and
a longitudinal coupled mode type surface acoustic wave filter formed on said piezoelectric substrate,
wherein different electrode materials are used for said at least one surface acoustic wave resonator and for said

longitudinal coupled mode type surface acoustic wave filter, respectively.

3. The surface acoustic wave filter according to claim 2, wherein the electrode material of said at least one surface acoustic wave resonator has a stronger power durability than the electrode material of said longitudinal coupled mode type surface acoustic wave filter.

4. The surface acoustic wave filter according to claim 3, wherein said at least one surface acoustic wave resonator has a laminated electrode configuration.

5. The surface acoustic wave filter according to claim 2, wherein said surface acoustic wave resonator and said longitudinal coupled mode type surface acoustic wave filter are cascaded together,

wherein said surface acoustic wave resonator is also connected to at least one inductor having one end grounded.

6. The surface acoustic wave filter according to claim 5, wherein the attenuation band of said at least one surface acoustic wave resonator is set to be higher than the pass band of said longitudinal coupled mode type surface acoustic wave filter.

7. The surface acoustic wave filter according to claim 5, wherein the other end of said inductor is connected to a side of said surface acoustic wave resonator which is opposite said longitudinal coupled mode type surface acoustic wave filter.

8. The surface acoustic wave filter according to claim 7, wherein a plurality of said surface acoustic wave resonators are cascaded together, and

wherein the side of said surface acoustic wave resonator which is opposite the longitudinal coupled mode type surface acoustic wave filter includes connection portions between said plurality of cascaded surface acoustic wave resonators.

9. The surface acoustic wave filter according to claim 4 or 5, wherein the other end of said inductor is connected to a connection portion between said surface acoustic wave resonator and said longitudinal coupled mode type surface acoustic wave filter.

10. The surface acoustic wave filter according to claim 8, wherein a plurality of said inductors are provided, and each inductor is connected to said surface acoustic wave resonator through respective different connection portions.

11. The surface acoustic wave filter according to claim 1 or 5, wherein said inductor moves a phase of an impedance at a frequency of said attenuation band closer to its open state.

12. The surface acoustic wave filter according to claim 11, wherein said inductor matches impedances at a frequency of said pass band to each other.

13. The surface acoustic wave filter according to claim 1 or 2, wherein different electrode film thicknesses are used for said at least one surface acoustic wave resonator and for

said longitudinal coupled mode type surface acoustic wave filter.

14. The surface acoustic wave filter according to claim 1 or 2, wherein a plurality of piezoelectric substrates are provided as said at least one piezoelectric substrate, and

wherein the piezoelectric substrate on which said at least one surface acoustic wave resonator is formed is different from the piezoelectric substrate on which said longitudinal coupled mode type surface acoustic wave filter is formed.

15. The surface acoustic wave filter according to claim 14, wherein at least one of said at least one surface acoustic wave resonator and said longitudinal coupled mode type surface acoustic wave filter is mounted in a face down manner.

16. The surface acoustic wave filter according to claim 15, wherein the other of said at least one surface acoustic wave resonator and said longitudinal coupled mode type surface acoustic wave filter is mounted using wires.

17. The surface acoustic wave filter according to claim 1 or 2, wherein the attenuation band of said surface acoustic wave resonator is a transmission frequency band in a PDC system, and the pass band of said longitudinal coupled mode type surface acoustic wave filter is a reception band in the PDC system.

18. An antenna duplexer, comprising:

an antenna terminal;

a reception filter connected to said antenna terminal;

a transmission filter connected to said antenna terminal;
and

a first phase circuit provided between said antenna terminal and said reception filter and/or a second phase circuit provided between said antenna terminal and said transmission filter, wherein the surface acoustic wave filter according to claim 1 or 2 is used as said reception filter.

19. The antenna duplexer according to claim 18, wherein all or part of said transmission filter is composed of a surface acoustic wave filter formed on a piezoelectric substrate.

20. The antenna duplexer according to claim 19, wherein said transmission filter is formed on the same piezoelectric substrate on which said surface acoustic wave resonator of said surface acoustic wave filter used as said reception antenna is formed.

21. The antenna duplexer according to claim 19, wherein said at least one surface acoustic wave resonator and said transmission filter are mounted on the same package or the same mounting substrate, and said longitudinal coupled mode type surface acoustic wave filter is mounted on a package or mounting substrate different from said package or mounting substrate.

22. The antenna duplexer according to claim 19, wherein the surface acoustic wave resonator of said surface acoustic wave

filter used as said reception filter and said transmission filter are formed on different piezoelectric substrates, and

at least one of said surface acoustic wave resonator and said transmission filter is mounted in a face down manner.

23. The antenna duplexer according to claim 22, wherein one of said surface acoustic wave resonator and said transmission filter is mounted in a face down manner, and the other is mounted face up for wire connection.

24. The antenna duplexer according to claim 19, wherein a barrier is provided at a boundary between two areas of the package or mounting substrate on which said surface acoustic wave resonator of said surface acoustic wave filter used as said reception filter and said transmission filter are mounted, said surface acoustic wave resonator being mounted in one of the areas, said transmission filter being mounted in the other area.

25. Communication equipment comprising:

an antenna duplexer according to claim 19;

an antenna connected to said antenna duplexer;

transmission means connected to said antenna duplexer of transmitting a signal via said antenna; and

reception means connected to said antenna duplexer of receiving a signal via said antenna.